

**Before the**  
**FEDERAL COMMUNICATIONS COMMISSION**  
**Washington, DC. 20554**

**In the Matter of**

)

**Inquiry Regarding Carrier Current )**  
**Systems, including Broadband over ) ET Docket No. 03-104**  
**Power Line Systems )**

**To: The Commission**

**Comments to Notice of Inquiry (03-104)**

**Comments of the Amateur Radio Research and Development  
Corporation (AMRAD)**

AMRAD is a non-profit scientific and educational corporation dedicated to the development and furtherance of electronic and communication technologies. Our members are licensed amateur radio operators and many members are degreed electrical engineers with extensive professional experience in the fields of communications and computers.

AMRAD appreciates the need for additional means of high speed Internet connectivity to the home. The uneven availability of this capability is experienced by our members and the need for new means for these connections is a matter of much discussion. The addition of the power companies as another source of high speed Internet connections is seen as desirable and useful.

**INTRODUCTION**

Amateur radio is a licensed service with an objective of insuring that operators of radio equipment have sufficient knowledge of radio theory and regulations such that interference is not a problem. Amateur operators have a strong concern for any interference, not only from a technical perspective, but also from a strong desire to operate cooperatively with other services and share the frequency spectrum, as is expected of all services, including the power industry.

Representatives of the electric power industry and the Commission clearly have a duty to investigate means toward possible delivery of Internet service using the power companies and their infrastructure as a public service. AMRAD asks that the Commission carefully consider the details of the proposed technologies and their adverse effects on users of licensed radio systems.

AMRAD is concerned that interference to licensed amateur radio operations may occur by the proposed implementation of BPL, particularly if existing Part 15 regulations were relaxed to accommodate interference levels from BPL. Licensed users of radio

frequencies must be protected from interference. Once BPL systems are installed, any interference created cannot be removed. The Commission has a history of care and attention to the Electromagnetic compatibility (EMC) of products. BPL technology should be subject to the same scrutiny historically applied to other systems and products to continue to protect the American public from interference to radio reception.

AMRAD observes that BPL installations on overhead power lines have a combination of factors of height, length and unbalanced RF currents that can lead to large amounts of unintended radiation and high directional gain. This radiation could become efficient enough that these BPL signals could carry for long distances with skywave propagation. Changes in sunspot activity could further increase the probability of skywave interference. By this mechanism every area of the U.S. could be impacted.

Potential interference to HF services is not limited to amateur radio operations, but may extend to HF (shortwave) broadcast reception and many other users of HF including U.S. military communications and scientific users such as radio astronomy.

It is not clear how much the individual BPL levels can be reduced while maintaining satisfactory Internet connections. Even if the near-field radiated signal levels were to conform to Part 15, with the broadband signals and directional gain of long overhead power lines, harmful interference may still be a problem.

BPL equipment manufacturers are not proposing use of frequencies below 1.7 MHz. This suggests that developers of BPL systems might be concerned that objectionable interference to AM band radio reception is likely, and that BPL systems would not be allowed in the marketplace were they to interfere with the commercial AM radio broadcast band.

AMRAD is particularly interested in understanding the impact of future BPL systems on amateur radio and the impact of amateur radio on BPL. Our members have outfitted a van to make it a mobile interference observing and measuring platform. This van is representative of what radio amateurs can put together locally and it is outfitted with member's own equipment.

AMRAD performed testing in Potomac, Maryland and found that the test BPL installation radiated signals in the HF band but the signal design avoided radio amateur allocated bands with the exception of the new 5 Mhz frequencies. The BPL signals radiated were impulsive and sporadic, with bursts correlated with packet transfers. The density of the pulses are expected to increase with the number of active users of the internet in the neighborhood. The radiation bands were centered on 5, 9 and 11 Mhz which nominally correspond to international shortwave bands. This installation used the high voltage lines to distribute the BPL signals and used only a single wire, which causes radiation. No attempt was evident in this installation to drive the power lines as a balanced line to reduce the unintended radiation and hence, significant radiation was observed. This installation turns the overhead power line into an effective center-fed dipole extending for hundreds of feet in either direction.

AMRAD has demonstrated that a group of radio amateurs can put together a capability to

observe and measure the interference emanating from a BPL system. AMRAD is able to help others in this endeavor. However, knowledge of where such BPL testing is ongoing is not readily available and more dissemination of this information is needed.

### **RECOMMENDATIONS**

AMRAD applauds FCC efforts to provide Internet connections to the homes of America through the power companies. Under this Inquiry, it would appear prudent that the FCC expand the scope to look at alternatives to BPL for distributing the Internet connection to the subscribers. The power companies have much to offer with their existing infrastructure, right-of-ways and easements to provide Internet connections to the home. AMRAD believes that other existing technologies such as Wireless Local Area Networks could alternatively be utilized by power companies to provide the last few hundreds of feet of connection on a cost competitive basis without the risks of HF interference. We see the Inquiry being too limited in scope if these alternate technologies are not explored.

- The FCC should establish an advisory group of government and industry technical experts to examine the results of testing from a comprehensive test of BPL technology during the Inquiry.
- The Inquiry should establish a test of BPL technologies to demonstrate by modeling and field testing the amount of interference within homes and in neighborhoods and the potential for interference via skywave propagation.
- The Inquiry should demonstrate that BPL is compatible with and does not interfere with HF communication users in the U.S. military, commercial, scientific, and amateur services.
- The FCC should encourage BPL proponents to exchange information with all users of the HF band, to jointly monitor test installations, and together learn methods that will allow successful deployment of this new technology.

The Inquiry test period should insure a variety of communities are equipped with BPL and include both underground and overhead wiring. Information on the locations and times of BPL operations should be readily available. Rural runs of overhead wiring could be of special interest and a rural BPL installation should be included in the Inquiry. The Inquiry test period should be extended to allow a thorough investigation of potential interference and the means to minimize interference to HF users.

AMRAD respectfully requests that the Commission proceed with great care in authorizing deployment of BPL systems so that use of the HF spectrum may continue unimpaired by this new technology.

Respectfully Submitted,  
George E. Lemaster, vice-president AMRAD  
PO Drawer 6148  
McLean, VA. 22106-6148